PATTERSON, THUENTE, SKAAR & CHRISTENSEN, P.A.
4800 IDS Center, 80 South Eighth Street
Minneapolis, Minnesota 55402-2100 USA

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DATE: August 16, 2005

TO: Examiner Eric B. Fuller
Group Art Unit 1762
FAX #: 571-273-8300

PHONE #: 703-308-6544

Application No.: 09/715,935
Applicant: BI et al.
Due Date: August 16, 2005
OUR REF.: 2950.16US02

FROM: Peter S. Dardi, Ph.D.
PHONE #: (612) 349-5746

Attached please find the following document for filing in the above-identified patent application:

1) Reply Brief Transmittal (1 page)
2) Reply Brief in Response to Examiner's Answer dated June 16, 2005 (13 pages)

Sincerely,

Peter S. Dardi, Ph.D.
Reg. No. 39,650

CERTIFICATE OF FACSIMILE TRANSMISSION

I hereby certify that this paper is being transmitted by facsimile to the U.S. Patent and Trademark Office, Fax No. 517-273-8300 on the date shown below thereby constituting filing of same.

August 16, 2005
Date

Peter S. Dardi

Customer No. 24113
Patterson, Thuente, Skaar & Christensen, P.A.
4800 IDS Center
80 South 8th Street
Minneapolis, Minnesota 55402-2100
Telephone: (612) 349-5740
Facsimile: (612) 349-9266

Attorney Docket No. 2950.32US03

REPLY BRIEF TRANSMITTAL

In re the application of:

BI et al.

Confirmation No.: 9146

Application No.: 09/715,935

Examiner: Eric B. Fuller

Filed: November 17, 2000

Group Art Unit: 1762

For: COATING FORMATION BY REACTIVE DEPOSITION

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Transmitted herewith is the Reply Brief in the above-identified application, with respect to the Examiner's Answer dated June 16, 2005.

Respectfully submitted,

Peter S. Dardi, Ph.D.
Registration No. 39,650

Please grant any extension of time necessary for entry; charge any fee due to Deposit Account No. 16-0631.

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August 16, 2005
Date

Peter S. Dardi

PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the application of:	Attorney Docket No.: 2950.16US02
Bi et al.	Confirmation No.: 9146
Application No.: 09/715,935	Examiner: Eric B. Fuller
Filed: November 17, 2000	Group Art Unit: 1762

For: COATING FORMATION BY REACTIVE DEPOSITION

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

REPLY BRIEF

Mail Stop Appeal Brief-Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

INTRODUCTORY COMMENTS

In response to the Examiner's Answer of June 16, 2005, Applicants submit this timely filed Reply Brief under 37 C.F.R. § 41.41.

Please grant any extension of time necessary for entry; charge any fee due to Deposit Account No. 16-0631.

CERTIFICATE OF FACSIMILE TRANSMISSION

I hereby certify that this paper is being transmitted by facsimile to the U.S. Patent and Trademark Office, Fax No. 517-273-8300 on the date shown below thereby constituting filing of same.

August 16, 2005
Date

Peter S. Dardi

REMARKS

Appellants address specific errors of law and fact from the Examiner's Answer.

I. General Comments

Error of Fact - Objective Evidence of Non-Obviousness Over Laser Pyrolysis References

Objective evidence refuting the motivation to modify the teachings of the references as asserted by the Examiner is of record. The Bi reference and Kambe reference relate to approaches for commercial applications of laser pyrolysis. Laser pyrolysis was developed by academic laboratories in the U.S. and foreign countries. Generally, the Haggerty group at Massachusetts Institute of Technology (MIT) is credited with the first experiments using laser pyrolysis with infrared lasers in the very early 1980s. It has been the position of the Examiner that the laser pyrolysis references teach basically the claimed processes except for minor modifications. However, the objective evidence refutes this assertion.

In laser pyrolysis, the product particle stream is directed to a collection channel that leads to a filter that separates the particles from the flow of gases. Certainly, the Examiner's position is that this teaching of laser pyrolysis would lead directly to Applicants' claimed invention in the roughly 20 years after the development of laser pyrolysis. But this would be the wrong conclusion based on the objective evidence of record.

Please see the MIT (Haggerty) group's work of record on coatings. Meunier et al., J. Applied Physics (American Institute of Physics) 62(7):2812-2821 (October 1, 1987) and Applied Physics Letters (American Institute of Physics) 53(9): 273-275 (August 1, 1983). They describe a fixed substrate and a batch process with a static atmosphere in which the coating condenses on the substrate rather than being directed toward the substrate. Another approach of extending the Haggerty group's work is described in Besling et al., J. Applied Physics (American Institute of Physics), 83(1): 544-553 (January 1, 1998). These innovative academic groups

simply did not conceptualize the present invention when generalizing laser pyrolysis to perform a coating process, which had been known for many years. These references provide clear objective evidence of nonobviousness.

II. Rejections Based on the Akedo Reference, the Bi Reference and the Rao Reference, as well as Additional Secondary References

1. Error of Law - References Must Be Considered as a Whole

Under the Supreme Court's Graham mandate and clear statutory guidance, cited references must be considered as a whole. "PRIOR ART MUST BE CONSIDERED IN ITS ENTIRETY, INCLUDING DISCLOSURES THAT TEACH AWAY FROM THE CLAIMS." MPEP 2141.03 (emphasis in original). This heading in the MPEP points out significant and fundamental problems with the Examiner's formulations of these rejections. The Examiner withdrew rejections over Rao and Bernecki. In Appellants' Appeal Brief, it was noted that Rao taught away from Appellants' claimed invention. Why then is Rao still being cited in other rejections against Group 1 claims? If Rao teaches away from the claimed invention, it is simply not combinable with other references if it is being cited for teachings related to the subject matter that teaches away from the claimed invention. The Examiner is not citing Rao for unrelated teachings. The Examiner is citing Rao directly for teachings relating to the features that teach away!

Rao teaches that a reactive flow with a radiation source must have the radiation source oriented at the substrate. this clearly teaches away from the claimed invention and the cited references do not make up for these deficiencies. The Examiner's ignoring of this teaching away punctuates again the hindsight basis using Applicants' claimed invention as a template of the Examiner's rejection. *Prima facie* obviousness has not been established with respect to any rejections of Group 1 claims that are based on the Rao reference.

2. Error of Law - Motivation

It is well established that the "mere fact that the prior art could be modified as proposed by the examiner is not sufficient to establish a *prima facie* case of obviousness." *Ex parte Granneman*, 68 USPQ2d 1219, 1221 (USPTO BPAI 2003)(nonprecedential), citing *In re Fritch*, 972 F.2d 1260, 1266, 23 USPQ2d 1780, 1783 Fed. Cir. 1992). While the *Granneman* case is nonprecedential, it is of interest since the examiner in that case, as the examiner in the present case, relied upon a hindsight motivation that was not recognized as a perceived need in the cited references or in the art generally at the time of filing the patent at issue. In *Granneman*, the inclusion of an additional reactor in a processing chamber was found patentable. With all due respect, the modifications at issue in *Granneman* are extremely modest in comparison with the modifications presently at issue, and no more motivation is found with respect to the present claims.

"It is impermissible to use the claimed invention as an instruction manual or "template" to piece together the teachings of the prior art so that the claimed invention is rendered obvious. This court has previously stated that '[o]ne cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to depreciate the claimed invention." *In re Fitch*, 972 F.2d at 1266.

The Examiner is only citing separate advantages of the individual references and has not provided any particular motivation for the combination. This is a clear error of law.

3. Error of Law - Reasonable Expectation of Success

As summarized in MPEP 2143, three criteria must be satisfied by an examiner to establish *prima facie* obviousness. "First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the

art, to modify the reference or to combine the teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim elements." The Examiner failed to address all of the issues raised by Appellants relating to the complete lack of a reasonable expectation of success on the present record.

The teachings of the references are significantly different. For example, the exhaust for the chamber is at the bottom (Figs. 1, 2 and 6-10) or lower side (Figs. 3-5 and 11) in the Akedo apparatuses. In contrast, the laser pyrolysis exhaust in the Bi and Kambe references are at the top. It is not at all clear how one would interface the laser beam with the coating apparatus in the Akedo patent.

The Akedo patent very clearly teaches that something must be done to get a coating formed, such as accelerating charged particles, interacting the particle flow with radiation at the surface, etc. Looking through all of the figures of the Akedo patent, none of these teach directing a beam of particles at a substrate to form a coating without some manipulation of the flow. These extra manipulations of the particle flow may or may not work with a reactive flow. The particles in a reactive flow are not the same as an aerosol of preformed particles. This difference is now clear in hindsight since Appellants' claimed method efficiently forms excellent coatings without any of the efforts described in the Akedo patent. Thus, there was not and should not have been any expectation that the particles in a reactive flow of the Bi patent would behave in the same way as the particles generated in the Akedo patent since the evidence confirms that they do not behave in the same way. There simply is no reasonable expectation of success in combining these teachings as suggested by the Examiner. The results of the present reference teach that the references are not simply combinable since the reactive flow responds differently from an aerosol of particles.

The Examiner cited the Rao reference for teachings that it was known in the art to combine a reactive flow with a coating deposition. However, this does not make up for the problems associated with the combination of the Bi reference or Kambe reference and the Akedo reference. This citation of the Rao reference has at least two deficiencies in addition to teaching away from Group 1 claims, as noted above. First, the Rao apparatus has a very specific structure to direct a high velocity plasma to the substrate. This configuration is not particularly relevant to the teachings in either the Bi reference or the Akedo reference. Also, the apparatus in the Rao reference does not move the substrate. The great efforts that must be used to obtain the coating in the plasma nozzle in the Rao reference actually suggests strongly that there would be no reasonable expectation of success in combining the teachings of the Bi reference and the Akedo reference since the Bi patent does not teach a hypersonic nozzle in combination with their reactive flow. Furthermore, Rao teaches a radiation beam along the flow, while the Bi patent teaches a radiation beam perpendicular to the flow. To make the combination, all of the differences in the technologies of the references have to be ignored to use the claimed components in a piecemeal reconstruction, in direct contradiction to legal mandates that piecemeal reconstruction of the invention contrary to the teachings of the cited art as a whole is forbidden.

4. Error of Fact - Group 2 Claims

In Appellants' main brief, it was pointed out that the cited references do not teach a coating process using an elongated reactant stream and do not provide a reasonable expectation of success since the reference do not suggest in any way how to combine an elongated flow with the coating process in the Akedo patent. In response to Appellants' arguments relating to Group 2 claims, the Examiner only asserted that claim 22 "does not require that the product stream be elongated, just the reactant stream. ... Figure 7 of Bi also shows the product stream can be

reshaped and redirected as needed." With all due respect, Figure 7 shows only redirection. The Bi patent does not show reshaping as asserted by the Examiner, and Figure 7 is stated as schematic in the brief description of the figures. With respect to the relationship between the reactant stream and the product stream, the reactant stream turns into the product stream once the flow passes through the light reaction zone. In the flow, an elongated reactant stream naturally turns into an elongated product stream.

A configuration claimed has considerable advantages since the scanning of a line of reactant product across a substrate corresponding to the elongated flow provides a fast and very efficient approach to the formation high quality coatings on a substrate. There are no references of record that provide this scanning of a wide area of product across a substrate from a reactive flow. This approach is pioneering.

The Examiner has clearly failed to establish *prima facie* obviousness of Group 2 claims.

5. Error of Fact - Group 3 Claims

With Respect to Group 3 claims, the Examiner asserts incorrectly that "[m]oving the substrate relative to the reactant stream (as taught by Akedo) and moving the reactant stream relative to the substrate are functional equivalents." With all due respect, this is untrue. The Examiner's conclusory statement to the contrary does not make it true. The movement of the reactant stream requires a difficult continuously variable redirection of the flow or the movement of the reactant stream, which requires scanning of the laser beam, which requires appropriate optical arrangements. A particular embodiment of such an apparatus is described further in U.S. 2005-0019504A. The Examiner has failed to provide any evidence to support his position. The Examiner clearly has not established *prima facie* obviousness of Group 3 claims.

6. Error of Fact - Group 5 Claims

The Examiner asserts incorrectly that "[s]ince the particle producing method taught by Bi is the same as the claimed invention, the method of Bi inherently would be capable of achieving such a rate." With all due respect, this is simply wrong. Appellants' claimed invention is not a particle production process as is clear from the plain reading of the claims. The deposition rate is a function of **both** particle production and deposition onto the substrate. None of the teachings in the cited references suggest in any way that the claimed process will have a deposition efficiency from the flow that will lead to the claimed deposition rate. The cited references simply do not teach all of the claim elements. The Examiner has clearly not established *prima facie* obviousness for the claims of Group 5.

7. Error of Fact - Group 6 Claims

With all due respect, the Examiner does not seem to have read the claims or Appellants' arguments. The claim relates to deposition **simultaneously** at **sequential locations** on the substrate and not the same position on the substrate. It is not clear what claim the Examiner is attempting to reject, but the Examiner has not articulated a proper rejection of the present claims because the rejection has not involved all of the features of the claimed invention. The claim is clear when read in light of the specification, but it is not the claim being rejected by the Examiner. The cited references simply do not teach or suggest all of the claim elements.

8. Error of Fact - Group 4 Claims - With the Tran Reference, the Lehman Reference and the Kambe Reference

The Examiner on page 17 of the Answer stated incorrectly that the "examiner has shown that the process of Kambe and the process of Akedo, used together, produce high quality glass coatings in an efficient manner." With all due respect, this statement is outrageous since

neither reference teaches the formation of glass coatings **at all** and certainly not with either a high quality or efficiently. The Kambe patent teaches silica particles for polishing. There are no teachings of forming glass coatings period. Appellants could not identify the description of an optical glass anywhere in the Akedo reference. With all due respect, unless the Examiner has spent hundred of thousands of dollars and has surprising expertise to have constructed such an apparatus, it is unclear what basis in reality forms the foundation for such a statement in the above quotation. The Examiner has not met any of the required three elements for establishing *prima facie* obviousness with respect to these claims.

III. Rejections Based on Börner, Bi and Rao, and Additional Secondary References

Errors of Fact - All the Elements Not Taught, No Motivation to Combine the References and No Reasonable Expectation of Success

The combined teachings of the Börner reference, the Bi reference and the Rao reference simply do not teach all of the claim elements for many of the relevant claims. Specifically, none of the three references teach or suggest moving a flow relative to a substrate. On closer examination, the Börner patent does not even teach moving the substrate or the spray nozzles. Thus, the combination of the Bi patent, the Börner patent and the Rao patent **do not even teach all of the claim elements** since none of the references teach moving the substrate relative to the flow. So under the correct legal standards, this combination cannot render the claims *prima facie* obvious.

Okay, let's go ahead and throw in the Akedo reference. Of course, the Börner reference teaches a process done at atmospheric pressure while the Akedo teaches that a vacuum is needed. The extreme deficiencies of the combination of Akedo, Bi and Rao references was discussed in detail above. The only possible thing that Börner could add to the combination is the simultaneous coating with different flow at the **same** location on a substrate. However, will

reactive flows behave in any way similar to the oppositely charged flow that the Börner patent teaches are needed for this simultaneous coating process? Who knows? If this assembly of disparate technologies is not a prime example of using hindsight based on the claimed invention itself to assemble pieces from the prior art to reject the claimed invention using the applicant's own teaching as a template, it is hard to image what would be.

The law is clear that references must be considered as a whole and the claimed invention must be considered as a whole. This is a fundamental underpinning of an obviousness analysis. This analysis is mandated by statute and elaborated by the Supreme Court in the Graham trilogy. See, for example, MPEP 2141.03.

However, the Examiner seems to completely ignore this mandate. In response to Appellants' arguments, the Examiner refutes Appellants' arguments relating to the combination of Boerner, Bi and Rao by stating "Borner requires a particle stream and Bi teaches a way to produce a particle stream. Bi explicitly teaches the motivation on why one would choose to use the process of Bi in producing particles. This certainly does not require hindsight reasoning. Borner is analogous art as both Borner and the present invention are pertinent to particle deposition processes."

Unfortunately, with all due respect, the Examiner does not use the correct legal standards. The present invention relates to the formation of coatings on a substrate from a reactive flow. For this general idea, the Examiner relies on the Rao reference. However, the Rao reference teaches the need for a hyposonic nozzle to get the flow to adhere to a substrate. The Rao reference **teaches away** from the claimed invention due to the direction of the radiation toward the substrate! The Rao reference does not teach moving the substrate. The Rao reference teaches that the Bi approach is not suitable for forming a substrate since it does not use a hyposonic nozzle. Contrary to the law, the references are ignored as a whole except for the piece

to assemble into the rejection. The deficiencies of the combination of references are shockingly extreme!

The Börner patent is directed to an "electrostatic coating process." Neither the Bi patent nor the Rao patent teach that their particles are charged. Thus, the combination of references is inoperative on the basis of the teachings in the references from the get go. Yet, we have been arguing this rejection for years. The Examiner has failed to come close to establishing a *prima facie* case for obviousness over these references.

IV. Rejections Over Bi and Carey

Errors of Fact - Non-Analogous Art, No Motivation to Combine the References, No Reasonable Expectation of Success

The Examiner stated that "Bi teaches all the limitations of claim 18, absent the moving of the substrate." However, this statement relates only to a first step in an obviousness analysis. While in an anticipation analysis, the context of the teachings of a reference may not be relevant, the context is critical for an obviousness analysis in which the evaluation of the teachings as a **whole** of the cited references is mandated under the law. The Bi patent does not consider their process as a coating process. This reference simply teaches the use of a filter to collect particles that are subsequently removed from the filter. This reference simply does not point in the direction of the current invention. Objective evidence of this reality is described above. Effectively, the Bi reference for particle collection is essentially non-analogous art to the formation of coatings.

The Carey patent is clearly non-analogous art, not withstanding the Examiner's conclusory statements otherwise. The Carey patent is directed to a new filter material to clean air from "dust and other foreign materials." These filters can be replacements for "conventional furnace filters." See, for example, column 1, line 9. The Carey material is designed to collect

impurities to throw in the trash. The roller configuration of the filter material makes sense to throw in the trash, but not for collecting nanoparticles. The filter system of the Carey patent clearly is not designed or appropriate for recovery of the particles. Thus, a person of ordinary skill in the art would simply not look to the home air cleaner art for teachings relating to the formation of coatings or for collecting particles for commercial applications.

On the other hand, the Bi patent describes a sophisticated apparatus for the production and collection of particles. The Bi apparatus is custom designed and costs more than $100,000 to make. The nanoparticles are expensive to produce and have a high value. These must remain extremely pure to have any value.

The Carey filter material is designed to move at a rate of two inches per day and to be replaced "at long intervals of 90 days or 180 days." See, for example, column 2, line 42. This does not correspond to any process suitable for commercial fabrication of anything. A person of ordinary skill in either the commercial coating art or the commercial nanoparticle production art simply would not look to home air filters for any suitable teaching. The Examiner has provided no evidence to counter this clear argument.

The Examiner counters this argument by saying that the Carey system "solves a problem that arises in the Bi reference." With all due respect, this is wrong for many reasons. First, the Bi patent provides direct and appropriate solutions for continuous operation in Figure 7. With all due respect, the Examiner has provided a solution in search of a problem to solve as a poor excuse for motivation to combine these wildly different references. Plus, Carey does not provide an approach suitable for the recovery of a coating or particles. The whole point of the Carey filter material is that the contaminants get removed for disposal and the layered structure of the material is consistent with this since the particles are trapped in a microfiber layer within two porous webs. Since the outer webs trap the collected material under the surface, this filter

material is not suitable for forming a coating or recovering particles. Thus, it is not reasonably combinable with the Bi teachings.

Under the proper legal standards, the Carey patent is non-analogous art, there is no motivation to combine the Bi patent with the Carey patent, the combination does not provide a reasonable expectation of success, the combination is inoperative etc. With all due respect, the Examiner is clearly assembling the pieces of the invention from the prior art using hindsight based on Appellants' own claimed invention as a template in clear contradiction of the controlling legal principles.

Due to a multitude of shortcomings, the combination of the Bi patent and the Carey patent does not come close to establishing *prima facie* obviousness.

SUMMARY

The Examiner has not establishing *prima facie* anticipation of claims 18-54 and 56-61. Therefore, the rejections should be withdrawn, and Applicants respectfully request such action.

Respectfully submitted,

Peter S. Dardi

Peter S. Dardi, Ph.D.
Registration No. 39,650

Customer No. 24113
Patterson, Thuente, Skaar & Christensen, P.A.
4800 IDS Center
80 South 8th Street
Minneapolis, Minnesota 55402-2100
Telephone: (404) 949-5730